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Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Spectrum Policy Task Force Inquiry Concerning Issues Relating to the Commission's Spectrum Policies	)))	ET Docket No. 02-135

COMMENTS

OF

ASSOCIATION OF AMERICAN RAILROADS

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TABLE OF CONTENTS

EXHIBITS:

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The Association of American Railroads ("AAR"), through its undersigned counsel, hereby responds to the Public Notice issued by the Federal Communications Commission on June 6, 2002 (DA 02-1311) soliciting public comment on a range of issues under consideration by the Commission's Spectrum Policy Task Force.

I. BACKGROUND AND INTRODUCTION

Since the 1940s, wireless communications systems have been a vital element in the railroad industry's day-to-day operations. Much of the railroad industry's use of wireless is safety-related, and the importance of railroad wireless systems has increased dramatically in recent years with advances in radio technology. Inevitably, the industry's use of wireless will continue to increase in the future. Because of its significant use of wireless technology, the railroad industry welcomes this opportunity to inform the Commission's Spectrum Policy Task Force on the critical role played by wireless communications in railroad safety and operations.

AAR is a voluntary non-profit organization composed of member railroad companies operating in the U.S., Canada and Mexico. AAR's members generate approximately 97% of the total operating revenues of all railroads in the U.S. One of AAR's roles is to represent its members in connection with federal regulatory matters of common concern to the industry, including matters pertaining to the regulation of communications and access to radio frequency spectrum. In addition, AAR has been certified by the Federal Communications Commission ("FCC") as the frequency advisory coordinator with respect to the operation of land mobile and other radio-based services used by the railroad industry. In this regard, AAR serves as the frequency coordinator not only for its own members, but also for other entities that meet the definition of a "railroad licensee" in the FCC's rules and regulations.[1] AAR is a member of the Critical Infrastructure Communications Coalition, which is a group of trade associations and industry representatives whose members operate communications systems which control and protect the nation's critical infrastructure, including representations of the railroad, electric, gas, water and petroleum industries.

The freight and passenger rail network in the U.S. is a vital component of the nation's "critical infrastructure." America's freight railroads carry over 40% of all intercity freight, 70% of all vehicles produced by domestic manufacturers, 64% of the nation's coal (which generates 36% of the nation's electricity), and 40% of the nation's grain.

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1 AAR's members consist of the largest ("Class I") railroads, but AAR serves as the frequency coordinator for many other railroad entities, including local and regional rail transit authorities, and short-line and regional railroads. According to Section 90.7 of the FCC rules, "railroad licensees" are "railroad common carriers which are regularly engaged in the transportation of passengers or property when such passengers or property are transported over all or part of their route by railroad." 47 C.F.R. § 90.7.

Freight railroads move just about everything, from lumber to vegetables, coal to orange juice, grain to automobiles, chemicals to scrap iron. They connect businesses with each other across the country and with markets overseas.

Similarly, the rail infrastructure throughout the nation is becoming increasingly important for commuters and passengers, particularly in the major urban centers of the U.S. As vehicular traffic on highways becomes more crowded and congested, local and regional urban planning authorities increasingly are turning to rail transit systems for an efficient and environmentally beneficial means of mass transit.

Railroads are the most fuel-efficient form of ground transport; railroad fuel efficiency has increased approximately 63% since 1980. If just 10% of the freight moved by highway were diverted to rail, the nation could save as much as 200 million gallons of fuel annually. The U.S. Environmental Protection Agency ("EPA") has estimated that for every ton-mile, a locomotive emits only about one-third the nitrogen oxides and particulates emitted by a typical truck.

As mentioned above, radio communication systems are a vital component of the railroad industry's operations. Much of the use of radio by the rail industry is safety-related. The importance of safety is self-evident given the nature of railroad operations which inherently involve the movement of people, heavy equipment and freight (including dangerous chemicals and other hazardous materials) at high speeds.

Thanks to the introduction of new technology, including spectrum-based radio communications systems, the railroad industry's train accident rate fell 67% from 1980 to 1998, including 20% since 1990. According to the Bureau of Labor Statistics, the railroad working environment is safer than other transportation modes, with railroad employees enjoying lower injury rates than their colleagues in the truck, transit and aviation industries. This highly successful safety record is due, in large measure, to the use of radio to coordinate train movements and warn of hazardous conditions. Access to spectrum is vital for the transmission of safety information. Without access to adequate frequencies, dispatchers would not be able efficiently to control train movements, ensure separations between trains, and coordinate emergency response efforts. Similarly, defect detecting equipment would not be able to relay information concerning hazardous conditions, and crew members would not be able to request emergency assistance.

The railroad industry's reliance on wireless technology has deep roots in Federal legislation, regulation and policy. Since as early as the 1920's, the U.S. Congress has recognized the important relationship between railroads and radio as part of the nation's critical infrastructure -- Section 4(j) of the Radio Act of 1927 authorized the Federal Radio Commission (the predecessor to the FCC) to exempt railroad radio systems from the Commission's regulations. This statutory provision was recodified in 1934 as Section 303(k) of the Communications Act of 1934, 47 U.S.C. § 303(k), and is still on the books to this date. In 1992, Congress passed the Rail Safety Enforcement Act, 49 U.S.C. § 20103(a), authorizing the Secretary of Transportation to prescribe regulations and issue orders concerning the use of radio in connection with railroad safety. Pursuant to that statutory authority, the Department of Transportation (DOT) has adopted regulations governing use of radio for safety-related purposes in the rail industry. For example, 49 C.F.R. Section 220.9 establishes requirements for equipping locomotives with radio communications capability, including "communications redundancy." Other DOT regulations (49 C.F.R. Sections 232.19 – 232.25) contain provisions governing the design, installation and operation of one-way and two-way end-of-train devices equipped with radio transmission capability.

In 1997, Congress again recognized the dependence of the railroads on spectrum (and the importance of continued access to non-commercial spectrum by critical infrastructure industries such as the railroads) when it specifically added railroads (together with pipelines and utilities) to the definition of "public safety radio services."[2]

As will be shown below, access to adequate spectrum is essential for the continued operation and growth of the nation's railroad infrastructure.

II. <u>RAILROADS ARE MAJOR USERS OF WIRELESS COMMUNICATIONS</u>

A. General Description of Radio in Railroad Operations

The railroad industry has been making extensive use of the radio frequency spectrum for over sixty years. Because of their specialized communications requirements, high reliability criteria, and unique coverage needs, the railroads have had to build, maintain and operate their own radio communications networks, rather than rely exclusively on commercial communications service providers such as the telephone companies.

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[2] Section 309(j) of the Communications Act of 1934, as amended by the Balanced Budget Act of 1997. See FCC's *Report and Order and Further Notice of Proposed Rulemaking,* WT Docket No. 99-87 (FCC 00-403), released November 20, 2000.

Since 1945, when the FCC established the "Railroad Radio Service," the railroads have used "private" land mobile frequencies for traditional functions such as onboard and wayside point-to-train communications. Mobile radio units with dedicated radio channels permit communications among dispatchers, yard crews, switch crews, signal technicians, mechanical and engineering crews, and other personnel. Virtually all railroad employees involved in operations carry a portable radio assigned for their use, in addition to using mobile radios installed in the railroads' vehicular fleet.

A partial list of various railroad radio operations is set out below:

- Onboard Radio – Mobile radio provides essential onboard communications from one end of a train to the other for transmissions which monitor and control train functions using one-way and two-way "end-of-train" devices. On passenger trains, onboard radio links enable communications between the crew in the locomotive and the conductors and trainmen in the cars.
- Dispatcher-to-Train – Radio is used to provide communications between trains and dispatch centers. The dispatcher is the railroad employee who has the responsibility of seeing that trains move safely and efficiently over the particular area of the railroad.
- Train-to-Train Radio – All trains on a given territory use the same channel for dispatch communications (usually called the "road" channel). Therefore, the crews of one train can talk to crews of other trains when such trains are within radio range. The crews of all trains have standing orders to observe the condition of passing trains with special reference to

potential hazardous conditions such as shifted loads or dragging equipment and communicate the condition of the train to the passing crew via mobile radio links.

- Automatic Wayside Equipment – The industry has deployed systems whereby detector devices on the right-of-way transmit warnings to train crews immediately when a defect on the train is detected. This system is used with such devices as hot box detectors, dragging equipment detectors and wide load detectors.
- Maintenance-of-Way Operation – The maintenance of railroad tracks, roadbeds and rights-of-way requires a wide variety of equipment, much of which is highly specialized. Examples are ballast cleaners, ballast tampers, spike drivers and tie renewers. Some of these machines operate off the track, but most of them use the railroad tracks for movement, and some of them are extremely heavy. Equipment of this kind is equipped with radios which are primarily used for "track assignments," i.e., authorizations for the maintenance equipment and crew to occupy a particular segment of tracks. These radio communication links are essential to ensure the safe occupancy of track by maintenance crews to protect them from train traffic.
- Trackside Maintenance Crews – Trackside maintenance forces, such as section forces, track supervisors, communications maintenance personnel, signal maintenance personnel, and engineering personnel operating along the railroad are provided with portable radios. The

communications carried on by these personnel in their regular work include communications with trains, with the dispatcher, with each other, as well as to report conditions along the railroad.

- Switching. Switching involves the movement of train cars from one set of track to another, e.g., from main lines to sidings and vice versa. This is facilitated by crews using voice radio.

- Signal and Switch Setting. Signal changing and the setting of track switches are accomplished by remote control using data radio links.

The railroads' use of radio has continued to grow as advanced specialized radio applications – many unique to the railroad environment – continue to expand. New uses include data links for wayside equipment, mobile data terminals, remote switch indicators and controllers, wayside telephones, event recorder ("black box") information from locomotives, and radio controlled brake activators. Changes in railroad industry operations contribute to the expanded use of land mobile radio systems. For instance, radio telemetry devices are performing functions previously performed by caboose personnel. Other functions previously done manually, such as the delivery of track warrants and train orders, are now accomplished with mobile radio equipment. Increased safety and redundancy requirements are also creating greater use of and dependence upon radio devices.

Railroad mobile radio operations are inherently nationwide in scope. For example, a locomotive may commence a trip near San Francisco and eventually travel all the way to the east coast of the U.S. During the entire trip, the locomotive must be in direct contact with appropriate rail dispatch and control centers, via land mobile radio equipment linked by long-haul, point-to-point microwave links. Nationwide interoperability of mobile radio equipment is therefore an essential component of the railroads' mobile communication systems because of the need for uniformity in operations from coast to coast. Indeed, a fundamental characteristic of railroad use of the radio frequency spectrum is the sharing of facilities, equipment and frequencies among railroads on a nationwide basis. Because of these sharing arrangements, mobile radio equipment must be interoperable from one railroad to another, and common frequencies must be used throughout the entire railroad industry. The Federal Railroad Administration ("FRA") has recognized that the "modern practices in which many locomotives operate over other railroads' lines" dictate nationwide interoperability.[3]

B. The Railroads' Communications Systems Play a Vital Public Safety Role.

Radio systems are vital to ensure safety on the nation's railroads. Radio communications are used to advise of dangerous conditions and, if necessary, to bring railroad operations to a halt to prevent unsafe operations. Radio communications between trains and work crews on the railroad rights-of-way are essential to protect railroad employees and the general public. Only radio can provide immediate

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3 Railroad Communications and Train Control, Federal Railroad Administration, U.S. Department of Transportation, Report to Congress, July 1994 at iii (hereafter "FRA Report"). The railroad industry is unique among all critical infrastructure providers in its requirement for *nationwide* interoperability of its mobile radio systems. The radio-equipment fleets of other critical infrastructure providers such as pipelines and electric utility companies are primarily used for maintenance, restoration and repair functions and are essentially local (or, at most, regional) in scope.

information on the location, direction and speed of movement of hundreds of trains operating at the same time on the major railroads of the nation.

The importance of radio spectrum for operational safety in the railroad industry has been well-documented by the FRA. In its Report to Congress on railroad radio communications, the FRA highlighted nine characteristics that cause the railroads to place a high premium on effective and secure communications:[4]

1. The size and weight or rail equipment makes train operations an extremely powerful and potentially destructive force.

2. This potential is magnified by the long stopping distances inherent in operation of heavy rolling stock using steel wheels on steel rail.

3. Operations are conducted over an extensive network of rail lines spanning lightly develop rural and wilderness areas as well as highly developed urban and suburban areas.

4. Railroads must contend with over 280,000 highway crossings at grade and countless other locations where pedestrians and vehicles may come into conflict with train movements.

5. The railroads face challenges presented by natural disasters and often rapidly changing weather conditions.

6. Consistent with productivity and safety objectives, the number of railroad employees and supervisors has been substantially reduced.

7. Train speeds have risen in response to service requirements, particularly for highly competitive services.

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4 FRA Report at 1-2.

8. Density of track occupancy has risen due to downsizing of plant and strong demand for rail service.

9. Elements of prior communications systems, such as pole lines, have outlived their useful lives and are being replaced by alternatives that are less costly to maintain.

The FRA Report reviewed in detail the various types of railroad communications systems, including those used for train movement and control, switching operations, defect detection and emergency response, and concluded that radio communications are an integral part of railroad safety planning and execution:

> Just as radio communications can be employed to save life after a train accident or incident, radio can be used to prevent serious accidents. Where automatic means of warning are not feasible or not provided (e.g., for broken rails, dangerously high water, fallen trees, derailed equipment fouling an adjacent main track, bridge damage from barge operations, etc.) radio communications may provide the last opportunity for accident avoidance....FRA is aware of numerous occurrences where use of voice radio has permitted accident avoidance or has significantly mitigated the severity of an accident.[5]

Telemetry systems for remote control and defect detection use radio frequencies to perform safety functions. These devices are a key component of the railroad industry's program for preventing derailments and other types of accidents and have led to a major reduction in accident rates, particularly over the last nineteen years. For example, journal detectors (also known as "hot box detectors") measure the temperature of the axle bearings of a rail car as it passes over the detector. If the

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5 Id. at 22-34.

bearings are overheated, a radio transmission alerts the train crew to stop the train and inspect the axle to determine whether to remove the car from the train or proceed at reduced speed. This is not an unusual occurrence; in fact these detectors will stop trains several times a week on each railroad. Similarly, wheel detectors identify railroad cars with malfunctioning brakes or "flat spots" on wheels. High-wide detectors are used to detect shifted cargo and give a warning prior to entry into tunnels. Dragging equipment detectors are used to ascertain the presence and location of loose equipment on the undercarriage of train cars which can become jammed in tracks and cause derailments or injure motorists or pedestrians at crossings.

As a train passes these detection devices, a radio transmitter sends the readings (in synthesized voice format) to crew members in the passing locomotive, and, by long distance microwave links, to the dispatcher. In the event defects are detected, train crews are required to stop the train, inspect the defect and take remedial action. Dispatchers, in turn, are able to alert other trains on the line. Often, the defects detected are not serious. The rate at which defects are detected, however, and the railroads' improved safety record over the last several years clearly demonstrates that such devices play a critical role in enhancing safety.

End-of-train devices provide a remote radio telemetry link between the end of the train and the crew members in the locomotive. By means of this radio link, the train crew is able to assess the adequacy of the braking system. FRA has adopted regulations requiring two-way end-of-train devices by which the locomotive crew can initiate via radio frequency an emergency brake application at the rear of the train.[6]

Mobile radio links are also used for the remote control of "distributed power" locomotives – additional locomotives placed in the middle of a train without crew members. Because the use of such locomotives distributes motive power throughout a train rather than locating it at a single forward point, the railroads are able to move longer trains more safely than would otherwise be possible.

Extensive documentation exists concerning use of railroad radio communications to avert accidents and coordinate rescue efforts. For example, a railroad radio channel was the means used to obtain emergency assistance upon the occurrence of a tragic derailment in 1993 involving a maritime vessel which caused the death of 47 passengers and crew aboard an Amtrak train.[7]

In addition to enhancing the safety of train movements and related operations, radio communications networks are used extensively to support another safety-related aspect of the railroad business: law enforcement. The railroad industry employs approximately 2,000 railroad police officers nationwide, who, under federal law (49 U.S.C. § 26101), are authorized to enforce the laws of any jurisdiction in which a

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6 49 C.F.R. Sections 232.21-232.25.

7 See Report of National Transportation Safety Board ("NTSB"), PB 94-916301, NTSB/RAR-94/01, adopted September 19, 1994, Notation 6167B, at 1, 8. The NTSB found that the passenger train derailment in a bayou near Mobile, Alabama, was caused by the dislocation of a railroad bridge that was struck by a maritime vessel (a barge under tow) in heavy fog, resulting, in part, from the lack of radar navigation competency on the part of the maritime personnel operating the towing vessel. Id. at 59, 61.

railroad owns property for the purpose of protecting the property of the railroads and their customers and the lives of employees, passengers or patrons of rail carriers. On railroad property, railroad police have arrest authority identical to that of state and local police, and often are called upon to coordinate their work with local law enforcement officials. Radio communication systems are used by railroad police departments in exactly the same manner as systems operated by state and local police departments, i.e., for surveillance, dispatching, undercover operations, tactical support, investigations, pursuits, and the like.

C. Specific Spectrum Bands Used by Railroads

There are six different categories of frequencies currently used by the railroad industry for support of train operations: (1) VHF channels (160.215 –161.565 MHz) primarily used for general voice dispatch, yard operations, train movement, and track maintenance communications, and secondarily (and increasingly) used for some types of data communications; (2) lower UHF frequencies (450-460 MHz) primarily for onboard systems such as end-of-train devices and remote control of mid-train locomotives; (3) six frequency pairs at 900 MHz for data communications in Advanced Train Control Systems (ATCS) and Positive Train Control (PTC) systems; (4) Location and Monitoring Service (LMS) frequencies at 902-928 MHz for inventory tracking; (5) Multiple Address System (MAS) at 900 MHz for various remote control functions; and (6) frequencies above 1 GHz for fixed point-to-point microwave communications. The first three of these groups are under the exclusive frequency coordination control of the railroad industry pursuant to Part 90 of the FCC's rules. The last three categories (LMS, MAS and fixed microwave) are used by the railroads in the same manner as any other user, i.e., the frequencies are shared with other business and industrial users on the basis of frequency coordination.

1. VHF Communications Systems

The railroads currently operate mobile radio systems on 91 channels between 160.215 – 161.565 MHz, using analog FM equipment with 25 kHz bandwidth operating on overlapped channels separated by 15 kHz from center to center. The industry has used this band since the 1940s, when the FCC first allocated these frequencies for use by the railroads. 39 F.C.C. 68, 137 (1945). The industry presently operates over 16,000 base stations, 45,000 mobile radios (in locomotives and other track vehicles), 125,000 portable radios, and over 5,500 radios connected to various types of "defect detectors" deployed throughout the rail network. Attached hereto as Exhibit A is a map showing the locations of the rail industry's base stations throughout the U.S.

In its "refarming" decision, the FCC adopted a new channel plan for the VHF land mobile channels that will allow the railroads to switch from their current channel plan (91 channels with 15 kHz channel centers using 25 kHz bandwidth radios) to a new channel plan (182 channels with 7.5 kHz channel centers using 12.5 kHz bandwidth equipment). AAR has developed a new channel plan, with the assistance of NTIA's Institute for Telecommunications Sciences, that will incorporate 80 trunked duplex voice channel-pairs, with five non-trunked channel-pairs, plus 11 simplex channels. A copy of the new channel plan is attached as Exhibit B.[8]

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[8] See NTIA Report 99-370, "An Evaluation of the Proposed Railroad VHF Band Channel Plan."

The new channel plan, which was adopted by the railroad industry in April, 2000, will incorporate the digital "APCO Project 25" technology and support an integrated voice and data system linking the following functions: dispatcher-to-train, train-to-train, defect detector communications, locomotive health and fuel management reporting, yard operations, crossing health reporting, switchman communications, and engineering performance monitoring. Attached as Exhibit C is a schematic diagram showing the VHF channel plan and a schematic diagram illustrating the aforementioned communications functions.

The new channel plan and the APCO Project 25 radio technology are currently being successfully demonstrated in a pilot project in the Pacific Northwest, funded by the U.S. Department of Transportation (Federal Railroad Administration) and the Oregon Department of Transportation. A critical element in implementing the new channel plan within the railroad community will be the cooperation by industry members to relocate to new channel assignments and to incorporate the new equipment in their mobile radio systems.[9]

2. Lower UHF Frequencies (450-460 MHz)

There are several channel pairs in the band 450-460 MHz earmarked by the FCC in Part 90 of the rules for certain types of railroad operations.[10] These frequencies are used by most railroads for one-way and two-way "end-of-train" ("EOT") devices.

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9 Such cooperation would not be possible if the existing channel assignment were intermixed with non-railroad users.

10 47 C.F.R. Section 90.35(c)(59).

The one-way EOT device provides an on-board telemetry link between the end of the train and the locomotive crew, providing information regarding the status of the train-end (i.e., motion detector, brake pressure monitor, etc.). The two-way EOTs operate in accordance with FRA safety regulations and provide a remote control link whereby the crew is able to initiate braking action commencing at the rear of the train – a major safety feature for trains transversing mountainous terrain.

The frequency pairs in the 450-460 MHz band also are used for remotely controlling "distributed power" locomotives – additional locomotives that are situated in the middle of a long train and operate without crew members aboard. These locomotives distribute motive power in the middle of a train (instead of only at the front), a significant safety enhancement for very long trains. These auxiliary locomotives automatically perform all operations needed in starting, pulling, and stopping a train in response to radio signals from the lead locomotive.

3. ATCS/PTC Spectrum

In 1988, the FCC set aside six channel pairs at 896/936 MHz for Advanced Train Control Systems and Positive Train Control (ATCS/PTC). The railroad industry currently operates over 1,000 base stations in the U.S. using these frequencies.[11] The history of AAR's involvement in ATCS/PTC is set forth in detail in the "Petition for Modification of Licenses" filed with the FCC by AAR on March 24, 2000, a copy of which is attached hereto as Exhibit D and incorporated by reference herein. On

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11 The same six frequency pairs are used for ATCS/PTC by railroads in Canada. The ATCS/PTC equipment aboard U.S. and Canadian locomotives is fully interoperable.

February 15, 2001, the FCC granted AAR's petition and converted AAR's multiple licenses into a single nationwide geographic license whose boundaries are defined by a 70-mile zone on either side of all railroad rights of way in the United States. A copy of the FCC's February 15 Order (DA 01-359) is attached hereto as Exhibit E.

4. LMS Spectrum at 902-928 MHz

The AAR maintains an industry-wide standard for an Automatic Equipment Identification (AEI) system that enables both fixed and varying information to be encoded within electromagnetic "tags" mounted on individual railcars, locomotives, containers, and other equipment. The tags can be automatically read (and the encoded information retrieved) by wayside AEI tag readers as the train passes. The system operates on frequencies in the 902-928 MHz band, which was allocated by the FCC for the location and Monitoring Service (LMS) in 1995. [12]

The system consists of a reader system (i.e., reader, RF module, and antenna) mounted at the wayside, and tags mounted on the equipment to be identified. The tags are constructed in such a way that when they pass through the focused RF field generated by the reader, they return a portion of the field's energy to the reader in the form of backscatter radiation. The tag "imprints" or modulates its information content onto the backscatter by frequency shift keying. The reader extracts the information from the tag and passes it on to other fixed facilities.

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12 Amendment of Part 90 of the Commission's Rules to Adopt Regulations for Automatic Vehicle Monitoring Systems, Report and Order in P.R. Docket No. 93-61.

The AEI tag standard calls for both non-battery-operated, and battery-operated versions of tags. Neither type has its own transmitter; both rely upon backscatter of the energy received from the transmitter (the battery power is used to bias the tag data for improved performance). Battery-operated tags are typically used for trailers and containers.

Both *static* tags (which contain a fixed data stream such as a permanent identifying code), and *dynamic* tags (which can be dynamically programmed to transmit limited amounts of user data at each interrogation) are in use. Static tags are programmed using special equipment, and then installed. Dynamic tags can be partially reprogrammed by systems on board the locomotive (or other equipment). One use of dynamic tags is to read locomotive fuel level during operation.

Dynamic tags can form the basis of a quasi-continuous one-way data communications network (involving continual rewriting of the tag data by an onboard data source, and continual interrogation by a reader). However, because AEI tags cannot send their data unless they are near a tag reader and receive an interrogation from that reader, their use for real-time command and control applications is limited to very discrete control points.

At present, there are approximately 1.4 million rail cars, locomotives and other vehicles equipped with AEI tags, and approximately 5,000 licensed tag reader stations operating at trackside locations and in terminals and rail yards throughout the U.S. and Canada. The railroads' AEI system is an invaluable tool in locating and keeping track of the industry's rolling stock, and helps promote the efficient operation of the nation's railroad infrastructure.

5. <u>900 MHz Multiple Address System (MAS) Frequencies</u>

Recently the FCC completed a proceeding in which certain MAS channels were reserved for private operational ("internal") use. 15 F.C.C. Rcd. 11956 (2000). The FCC set aside frequencies in the 928/952/956 MHz bands for "private internal" use, i.e., "where licensees use their authorized frequencies purely for internal business purposes…and not on a for-hire or for profit basis." Some railroads are using frequencies in the FCC's MAS allocation for "SCADA"[13] operations involving the remote control of switches and signals along the rail right-of-way.

6. <u>Point-To-Point Microwave Systems Above 1 GHz</u>

The railroad industry deploys and depends on a sophisticated and comprehensive radio communications network consisting of fixed point-to-point communications systems and facilities which are used to link together many of the mobile radio systems (e.g., the VHF and ATCS/PTC systems) described above. The railroads use private fixed microwave systems that operate on frequencies in the 2, 6, 11, and 18 GHz bands to meet safety and reliability requirements in their day-to-day operations. Private microwave facilities are used to monitor and control more than 1.4 million freight cars on more than 215,000 miles of track. For example, microwave systems carry information regarding train signals and the remote switching of tracks and routing of trains that are necessary for the safe operation of trains on rights-of-way and through depots and freight yards. These systems also relay critical telemetry data from trackside defect detectors located throughout the rail network. Information about

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13 "Supervisory Control and Data Acquisition."

damaged rails, overheated wheel bearings, dragging equipment, rock slides and the like is automatically transmitted from these detectors via mobile radio links to crew members in trains, who can then take the necessary actions to prevent derailments, and via fixed microwave links to dispatchers in distant locations, who are required to know the status of the equipment along the routes for which they are responsible. Microwave systems also are vital to coordination of operations between and among the different railroads.

III. <u>MARKET-ORIENTED SPECTRUM POLICIES</u>

In its Public Notice inviting comments in this proceeding, the Commission's Spectrum Policy Task Force asked for recommendations on specific policy or rule changes that would facilitate migration from current spectrum allocations to more market-oriented allocation methods, such as auctioning. As a general rule, AAR recommends that the Task Force maintain a clear distinction between two classes of spectrum uses: (1) mass market, consumer-oriented, subscriber-type uses such as cellular and PCS services, and (2) essential industry-specific uses for which there is a safety-related function. The latter category is the classic scenario for "private networks" such as those operated by the railroads (as described herein) and other critical infrastructure industries such as water, gas and electric utilities, and petroleum and pipeline companies.

While market-oriented licensing methods such as spectrum auctions may be appropriate for the first type of use, they are not an appropriate mechanism for the second category. This is true for several reasons. First, it is almost a certainty that in any auction for spectrum, commercial service providers will always be able to outbid entities whose anticipated use of the spectrum is for operational support of infrastructure services. Second, if critical infrastructure entities such as railroads were required to rely exclusively on commercial providers for all their wireless communications needs, there is a strong likelihood that those needs would go unmet in many geographic areas. As has been demonstrated in the wake of the PCS spectrum auctions, commercial service providers offer service in markets where they can expect the greatest return on their spectrum investment, which means that major urban centers will be served while rural, remote locations will not. In many geographic areas of the country where railroads operate, commercial mobile radio service is simply unavailable. It is axiomatic that mobile communications coverage must be available where the trains are, and railroad rights-of-way in many parts of the nation are in remote areas, far from any commercial communications infrastructure. Indeed, many trackside radio transmitters are in places where there are no nearby roads or highways – they are accessible for maintenance and repair only by means of the nearby railroad tracks that they serve and support.

Furthermore, in many operational and safety-related settings (such as, for example, relaying signal and track-switching information over their long distance point-to-point microwave networks), the railroads require a level of reliability that is many times higher than that available on circuits provided by common carriers. Railroads also depend upon reliable communications during emergencies and natural disasters. When earthquakes, floods and hurricanes occur, the circuits of the telephone companies are busy or simply do not work. In such circumstances, the railroads must rely on their own communications networks.

Another question posed by the Task Force was whether spectrum sharing mechanisms should be considered for public service and public safety agencies at the federal, state and local levels, as well as critical infrastructure industries. At the present time, the railroads share spectrum (through the frequency coordination process) among themselves and, in some cases, with other industrial and business users. In its role as the frequency coordinator for spectrum used by the railroad industry, it has been AAR's experience that spectrum sharing works best when the sharing group consists of like users with similar operational goals and missions. Whether at the design stage or implementation stage, sharing regimes work best when there is cooperation, deference and accommodation among the sharers, and those attributes are more likely to be present when sharing occurs among like users. Accordingly, AAR recommends that the Task Force avoid adoptions of any sharing mechanisms that require sharing among dissimilar users.

IV. INTERNATIONAL ISSUES

Another question posed by the Task Force pertained to the role international considerations should play in the formulation of spectrum policy in the U.S.

AAR and its member railroads have long been aware of the importance of international spectrum regulations and policies because there is a significant international aspect to the railroads' VHF spectrum usage dating back to 1959. At the World Administrative Radio Conference held that year ("WARC-59"), an international agreement identified the bands 160.625-160.975 MHz and 161.475-162.025 MHz for exclusive worldwide use of maritime telecommunications as spelled out in Appendix 18 of the Radio Regulations of the International Telecommunications Union. However, a